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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Serial No.: 10/069,047

Confirmation No.: 9304

In re Application of:

Katsuya SAKAYORI et al.

Group Art Unit: 1711

Filed: February 21, 2002

Examiner: Melanie Bissett

For: LAMINATE AND USE THEREOF

TRANSMITTAL OF DECLARATION UNDER 37 CFR 1.132

Commissioner for Patents  
P. O. Box 1450  
Alexandria, Virginia 22313-1450

Sir:

Further to the Amendment Under 37 CFR 1.111 filed September 17, 2004, enclosed is a Declaration Under 37 CFR 1.132 of Katsuya Sakayori, the first named inventor, reporting the results of tests carried out under his direction and control based upon the synthetic examples in Shimose et al. '918 used to reject the claims.

We have been informed that the mention of 43.6g of PMDA in Synthetic Example 5 on page 4 of the Declaration was a typographical error and that the synthetic example was indeed carried out in accordance with the related synthetic example of the reference.

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The values regarding etching rates and ratios appear on page 6 of the document and confirm the statements and arguments made in the most recent reply.

Reconsideration of the case is earnestly solicited.

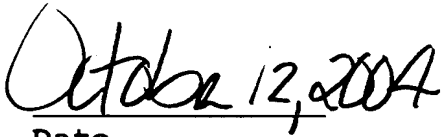
Respectfully submitted,

PARKHURST & WENDEL, L.L.P.



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Date

CAW/ch

Enclosure:

Declaration Under 37 CFR 1.132

Attorney Docket No.: DAIN:668

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PARKHURST & WENDEL



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Assistant Commissioner for Patents

P.O. Box 1450

Alexandria, Virginia 22313-1450

SIR:

DECLARATION UNDER 37 CFR 1.132

I, Katsuya SAKAYORI, the undersigned, a citizen of Japan and a resident of 1-1, Ichigaya-Kaga-Cho, 1-Chome, Shinjuku-Ku, Tokyo, Japan, do hereby declare as follows.

1. I am a researcher of electronic device materials including the subject matter claimed in the above-identified patent application entitled "LAMINATE AND USE THEREOF" which was given United States Serial No. 10/069,047, and accordingly I am fully familiar with the contents of the patent application.

2. I graduated from CHIBA University, the Faculty of Engineering, the Department of Materials Science in March 1996, and finished the Master's Course of the graduate school of Materials Science, CHIBA University in March 1998. Since April 1998, I have been employed by Dai Nippon Printing Co., Ltd., and I have been engaged in research and development of electronic device materials.

3. I have read and am familiar with the contents of the application in caption and am also familiar with the references cited by the U.S. Patent and Trademark Office Examiner in the Official Action. In view of the Examiner's position shown in the Official Action, I have under my direction and control conducted a check experiments to trace Synthetic Examples 1-5 of the cited reference, Nippon Steel Chemical, the English language equivalent of which is US 6,203,918B1, the particulars of which are given hereinbelow.

4. The production process according to Synthetic Examples 2-5 of the cited reference was carefully repeated according to the following procedures. With regard to Synthetic Example 1, we evaluated the etching rate of the resin layer according to my knowledge/experience so far since the monomers MABA (4,4'-diamino-2'-methoxybenzanilide) employed in Synthetic Example 1 was not available. With regard to Synthetic Example 6, we could not evaluate this example since BAPB (4,4'-bis(3-aminophenoxy)biphenyl) employed in this example was not available and BAPB is not familiar with us.

The symbols used in each examples stand for the following components.

PDA: p-phenylenediamine

DAPE: 4,4'-diaminodiphenyl ether

APB: 1,3-bis(4-aminophenoxy)benzene

BAPS: bis(4-aminophenoxy)benzene

PMDA: pyromellitic acid dianhydride

DMAc: N,N-dimethylacetamide

#### Synthetic Example 2 (Polyimide B)

The procedure of Synthetic Example 2 was followed on the 1/10 scale. 7.5 g (0.07 mole) of PDA and 6.01 g (0.03 mole) of DAPE were dissolved in 201 g of DMAc in a 500 ml-separable flask with stirring. The solution was then cooled in an ice bath and 21.8 g (0.1 mole) of PMDA was added with passage of a stream of nitrogen. The solution was allowed to return to room temperature and stirred continuously to cause polymerization. However, the solution was changed into a gel after about 1 hour of stirring. Therefore, this synthesis experiment was repeated except that the amount of the solvent DMAc was changed to 437.41 g. In this case, gelation did not occur and the solution was returned to room temperature and stirred for 3 hours to obtain a viscous solution of polyimide precursor B.

#### Synthetic Example 3 (Polyimide C)

The Procedure of Synthetic Example 3 was followed on the 1/10 scale. 29.23 g (0.1 mole) of ABP were dissolved in 369 g of DMAc in a 500 ml-separable flask with stirring. The

solution was then cooled in an ice bath and 35.83 g (0.1 mole) of DSDA was added with passage of a stream of nitrogen. The solution was allowed to return to room temperature and stirred continuously to cause polymerization. However, the solution was changed into a gel after about 1.5 hour of stirring. Therefore, this synthesis experiment was repeated except that the amount of the solvent DMAc was changed to 584.03 g. In this case, gelation did not occur and the solution was returned to room temperature and stirred for 3 hours to obtain a viscous solution of polyimide precursor C.

#### Synthetic Example 4 (Polyimide D)

The procedure of Synthetic Example 4 was followed on the 1/10 scale. 29.23 g (0.1 mole) of APB was dissolved in 353 g of DMAc in a 500 ml-separable flask with stirring. The solution was then cooled in an ice bath and 28.66 g (0.8 mole) of DSDA and 43.6 g of PMDA were added with passage of a stream of nitrogen. The solution was allowed to return to room temperature and stirred continuously for 3 hours to cause polymerization thereby obtaining a viscous solution of polyimide precursor D.

#### Synthetic Example 5 (Polyimide E)

The procedure of Synthetic Example 5 was followed on the 1/10 scale. 43.25 g (0.1 mole) of BAPS were dissolved in 316 g of DMAc in a 500 ml-separable flask with stirring. The solution was then cooled in an ice bath and 35.83 g (0.1 mole) DSDA and 43.6 g of PMDA were added with passage of a stream of nitrogen. The solution was allowed to return to room

temperature and stirred continuously for 3 hours to cause polymerization thereby obtaining a viscous solution of polyimide precursor E.

#### Preparation of laminates

A stainless steel foil (tension-annealed SUS304, product of Nippon Steel Corporation, Japan) was coated with each of the solutions obtained in Synthetic Examples 2-5 by means of an applicator and dried at a temperature of 130°C for 30 minutes. Further, each sample was heat treated at a temperature of 160°C (4 minutes), 200°C (2 minutes), 270°C (2 minutes), 320°C (2 minutes) and 370°C (2 minutes) in a circulation oven. In view of the possibility that imidation reaction is not sufficient under the above heat treatment conditions, additional samples were prepared by elevating the temperature of each sample from room temperature to 140°C over 30 minutes in a nitrogen gas stream and further heating the sample at 140°C for 60 minutes, and elevating the temperature to 350°C for 30 minutes and maintaining the sample at 350°C for 60 minutes, and then cooling the sample to room temperature over 1 hour.

#### Determination of etching rate

Each sample laminate was cut to an appropriate size and cutting was conducted at the center of each sample laminate with a cutter knife, followed by the measurement of the film thickness as an initial film thickness with a tracer type film thickness meter Dektak (Decktak 16000: tradename, manufactured by Sloan Technology). The samples were dipped into 100% hydrated

hydrazine at 50°C with stirring to calculate the etching rate by subtracting the resin film thickness after dipping from the initial resin film thickness to determine the degree of reduction in film thickness. For each sample, the degree of reduction in resin film thickness per unit time, that is, the etching rate, is shown below.

Synthetic Example 1 (Polyimide A): 4.0 to 5.0 microns/min  
 Synthetic Example 2 (Polyimide B): 6.4 to 6.9 microns/min  
 Synthetic Example 3 (Polyimide C): 0.27 to 0.54 micron/min  
 Synthetic Example 4 (Polyimide D): 0.06 to 0.23 micron/min  
 Synthetic Example 5 (Polyimide E): 0.13 to 0.60 micron/min

The resins prepared in Synthetic Examples 1 and 2, Polyimides A and B, are classified as low expansion polyimides and have a higher etching rate to hydrazine. On the other hand, the resins prepared in Synthetic Examples 3 to 6, Polyimides C, D, E, and F, are classified as thermoplastic polyimides and have a relatively low etching rate to hydrazine.

Examples 1 to 5 and 7 to 9 disclose the following laminates of the above polyimides, in combination, in Synthetic Examples 1 to 5, i.e., Polyimides A to E, respectively.

<u>Example</u>	<u>Resin Layers</u>	<u>Etching Rate Ratio</u>
Example 1	Polyimides A and C and D	17.4-83.3
Example 2	Polyimides A and C and E	6.7-38.5
Example 3	Polyimides A and D	17.4-83.3
Example 4	Polyimides A and C and D	17.4-83.3
Example 5	Polyimides A and C and D	17.4-83.3
Example 7	Polyimides A and C and D	17.4-83.3
Example 8	Polyimides A and C and D	17.4-83.3
Example 9	Polyimides A and C and D	17.4-83.3

The above results of the etching rate of each resin, i.e., the ratio of the higher etching rate to the lower etching rate, show that none of the combination of the resin layers described



in Examples 1 to 5 and 7 to 9 falls within the claimed etching rate ratio of 6:1 to 1:1 (i.e., 6 to 1).

5. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

October 4 , 2004

Declarant: *Katsuya Sakayori*  
Katsuya SAKAYORI